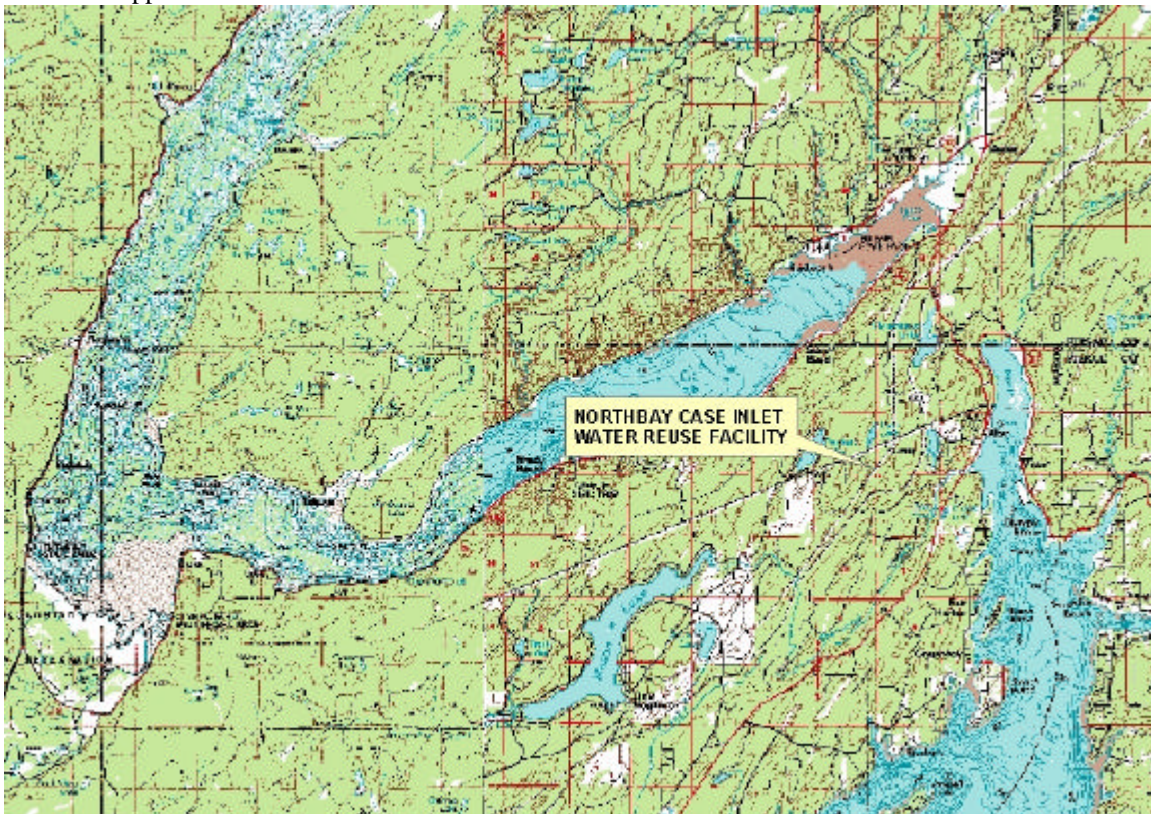


North Bay Case Inlet Water Reclamation Facility

Keywords: Water Reuse Facility, Shellfish, Harvest, Coliform, Bacterial, Contamination

Introduction

The North Bay/Case Inlet Water Reclamation Facility owned and operated by Mason County Public Works has successfully addressed fecal coliform and nutrient contamination problems in North Bay. It is located approximately two miles west of North Bay above Lakeland Village and produces effluent consistent with Class A Water Reuse Standards for the communities of Allyn, Victor and Lakeland Village. Failing on-site septic systems were the primary cause of water quality problems in North Bay first identified during the early 1980s by the Washington State Department of Health and Mason County. This led to declaration of a Severe Public Health Emergency and closure of these waters to harvest of shellfish. This project eliminated hundreds of substandard on-site sewage disposal systems. The success of the North Bay/Case Inlet Water Reclamation Facility can be directly applied to nutrient and bacterial contamination problems in Lynch Cove and Upper Hood Canal.



Background

The waters of North Bay/Case Inlet are an important source of recreational, commercial and tribal shellfish harvest. They lie at the head of a shallow bay approximately 150 miles from the open waters of the Strait of Juan de Fuca and receive limited flushing from tidal action. The main communities on North Bay are Victor on the east side and Allyn on the west. The Lakeland Village Community lies approximately one-half mile west and above Allyn. The North Bay/Case Inlet Water Reclamation Facility is located approximately one mile to the west of Lakeland Village. The community of Belfair at the head of Lynch Cove on Hood Canal lies approximately three miles to the north of Allyn. Lynch Cove and upper Hood Canal are experiencing fecal coliform and nutrient contamination problems similar to those found in North Bay/Case Inlet prior to construction and operation of the Water Reclamation Facility. In Hood Canal these problems have contributed to low dissolved oxygen levels and fish kills in recent years.



North Bay/Case Inlet looking south



Typical waterfront development at Point Victor at the SE side of North Bay is the eastern extent of the North Bay/Case Inlet Water Reclamation Facility's collection system.

History

Water quality monitoring studies conducted by the Washington Department of Health and Mason County in the early 1980s found high levels of fecal coliform bacteria in the waters of North Bay/Case Inlet (up to 92,000-organisms/100 ml). In April of 1991, the Mason County Office of Water Quality completed an On-Site Sewage System Survey of North Bay/Case Inlet, and a similar study in 1993 focusing on commercial systems in the town of Allyn. These studies found that failing septic systems in the communities of Allyn, Victor and the along the surrounding shoreline of North Bay were the primary contributors to the high bacterial levels. These were attributed to poor soils, small lot sizes, poor original septic system design, high groundwater tables and stormwater especially in shoreline areas. The results of these studies led the Washington Department of Health to declare the waters of North Bay/Case Inlet a severe public health hazard in May of 1991. The waters of North Bay/Case Inlet were closed to shellfish harvest at this time. Further studies and monitoring allowed the Department of Health to classify most of North Bay as "conditional use for shellfish harvest." The area around Allyn was classified as "prohibited." The North Bay Water Reuse Facility opened in 2002 and the Washington Department of Health upgraded the classification of 110,000 acres of North Bay/Case Inlet from "Conditional" to "Approved for Shellfish Harvest." The area between Allyn and Sherwood Creek remains classified as "Prohibited."

Mason County assumed the role of lead agency for planning wastewater treatment improvements around North Bay/Case Inlet in 1991. A Wastewater Facilities Plan was prepared to recommend approaches to solving the bacterial and nutrient contamination problems in the area, and to address the actions required by a Consent Order agreed to by the Department of Ecology and Mason County. This Consent Order described the "affected areas" within Mason County and further states that existing waste disposal problems in the affected area are resulting in the continuing degradation of surface waters. Mason County and the Washington State Departments of Ecology and Health had all determined that the release of pollutants from failing on-site sewage systems in the affected area required corrective action to protect public health and welfare from the environment.

North Bay/Case Inlet Water Reclamation Facility and Collection System

A Wastewater Facilities Plan was prepared to provide recommendations to solve the water quality problems in North Bay. The recommended approach to achieve this goal was to eliminate on-site sewage disposal systems within the drainage basin around North Bay. To achieve this goal, the Facilities Plan recommended construction of the North Bay/Case Inlet Water Reclamation Facility.

The North Bay/Case Inlet Water Reclamation Facility and Collection System consists of the following collection, transmission, treatment and disposal elements: Approximately 107,000 lineal feet of sewer main and lateral pipelines serving the communities of Allyn, Victor and Lakeland Village; seven pump stations; and a 0.304 million gallon/day Water Reclamation Facility.

The wastewater collection and conveyance system consists of the following components: Residences in shoreline areas are connected to grinder systems. Sewage is pumped to low-pressure sewer mains around North Bay. Residences in Lakeland Village are connected to a combination of gravity and low-pressure mains. Two booster stations connect Lakeland Village with the other sections of the collection system. Wastewater from around North Bay is collected and pumped by two pump stations along existing rights-of-way owned by Tacoma Public Utilities to the Water Reclamation Facility site above Lakeland Village.

The Water Reclamation Facility is a Sequencing Batch Reactor (SBR), which is a fill-and-draw activated sludge process. Effluent from the SBR is decanted to an equalization basin and pumped out of the lagoon to a fiber-type filter for solids removal. Final effluent flows through an UV disinfection unit prior to pumping to the sprayfield irrigation area or to the Class "A" storage pond. Wastewater sludge (biosolids) is removed from the aerobic digester and hauled to an existing permitted application site.

Water reuse is accomplished by land application on Department of Natural Resources Property located approximately one mile west of Lakeland Village and two miles from North Bay. This location was chosen due to its isolation, absence of sensitive wetlands or surface waters in the immediate vicinity, the presence of well-drained Everett Soils, and cooperation on the part of the Department of Natural Resources regarding use of its property for land application.





Funding

Funding for the North Bay/Case Inlet Water Reclamation Facility came from a number of state and federal grant and loan programs. These funding programs included the USDA Rural Development Administration, Grant and loan programs administered by the Department of Ecology (i.e. Centennial Clean Water Grant Program and State Revolving Fund) and Planning Grants from the US Forest Service.



Mouth of the Union River at the head of Hood Canal



Community of Belfair on Hood Canal

Applicability to water quality problems in Hood Canal

The North-Bay/Case Inlet Water Reclamation Facility (WRF) went on-line in 2002. It was designed for 1,400 connections assuming a sewage discharge of 218 gallons per day (gpd)/connection for a system capacity of 304,000 gallons per day. Mason County has only been required to operate its sprayfield about half time due to higher than expected infiltration rates in the WRF storage pond. The sprayfield has accommodated the current plant flows with no evidence of higher groundwater levels or additional runoff through existing culverts.

Capacity of the North Bay/Case Inlet WRF can be expanded for the following reasons. The 218-gpd/connection design value was conservative and the actual amount after three years of operation is significantly less. Actual capacity of the WRF is, therefore, at least 1,800 connections. There are currently about 1,100 connections to the system, leaving an additional capacity of 700 connections available at the WRF as it is currently configured. Addition of another SBR unit at the WRF would expand capacity to about 2,800 connections.

Mason County is currently planning to expand the service area of the North Bay/Case Inlet WRF to include the Belfair Growth Management Area on Lynch Cove/Upper Hood Canal in the near future. Plans are moving forward to install new conveyance lines from Belfair to the WRF, and to eventually expand service west to the shoreline residential areas near Belfair State Park in the future as funding becomes available.

Conclusions

Water Reclamation has successfully addressed fecal coliform contamination associated with failing septic systems around North Bay/Case Inlet. Most of North Bay (with the exception of the immediate vicinity of Allyn) has been recertified for shellfish harvest, since the North Bay/Case Inlet Water Reclamation Facility went online. Connection of the Belfair UGA to the WRF and eventual extension of service to shoreline areas along upper Hood Canal would contribute to similar improvements in water quality in Lynch Cove. It should be noted that bacterial and nutrient contamination associated with stormwater runoff from development of shoreline areas remains a problem that can lead to periodic closures to shellfish harvest, especially after heavy rain events.

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